January 18 (Lecture 1): **First class meeting.** Intro to the course, administrative details, focus of the course: Principles, Tradeoffs, and Implementation. Levels of transformation, instruction supply, data supply, processing.

January 19: Special discussion section, Intro to the CAD tools we will be using in the course.


January 24: Discussion session: Review the use of CAD tools on the logic design of a simple ALU.

January 25 (Lecture 3): The x86 ISA in the context of ISA tradeoffs. Some implementation issues. **Note: Problem set 1a is due at the beginning of this class.**

January 30 (Lecture 4): ISA/uarch tradeoffs.

January 31: Discussion session.

February 1 (Lecture 5): Evolution of the Uniprocessor, including SIMD, VLIW, DAE, HPS, Data Flow. The basic superscalar, out-of-order execution model. Effective use of long pipelines without blocking. The structure of a modern pipeline. Functions at each stage. **Note: Problem set 1b is due at the beginning of this class.**

February 6 (Lecture 6): Evolution of the uniprocessor, continued.

February 7: Discussion session.

February 8 (Lecture 7): Run-time optimizations. Trace Cache, Runahead, etc.

February 13 (Lecture 8): Multithreading -- HEP, SMT, SSMT.

February 14: Discussion session.

February 15 (Lecture 9): Branch Prediction **Note: Problem set 2 is due at the beginning of this class.**

February 20 (Lecture 10): Compile time optimizations. The Block-structured ISA, Predication, leading to wish branches, Braids, etc. Preview to the future: multiple levels of cache, fast track/slow track.

February 21: Discussion session.

February 22 (Lecture 11): Compile time optimizations, continued.
**Note:** Problem set 4 is due at the beginning of this class.

February 27 (Lecture 12): Additional optimizations.

February 28: Discussion session, as needed.

February 29 (Lecture 13): Integer Arithmetic.

March 5, 6, 7: Prepare for initial project design reviews.

**March 8, 9:** Initial project design reviews in 541a ENS.

March 12-16: Spring break, no classes.

March 19 (Lecture 16): Floating Point Arithmetic.

March 20: Discussion session, as needed.

March 21 (Lecture 17): Floating Point, continued.

March 26 (Lecture 18): Review or catch up.

March 27: Discussion session: prepare for written exam.

March 28 (Lecture 19): **Written exam, in class.**

April 2 (Lecture 20): RISC: A retrospective.

April 3: Discussion session, as needed.

April 4 (Lecture 21): Intro to Multiprocessing.

April 9 (Lecture 22): Cache Coherency.

April 10: Discussion session, as needed.

April 11 (Lecture 23): Memory consistency.

April 12, 13: **Oral exams (exam 2) in 541a ENS.**

April 16 (Lecture 24): Prefetching in the context of multicore.

April 17: Discussion session, as needed.


April 23 (Lecture 26): Measurement methodology and abuses.

April 24: Discussion session, as needed.

April 25 (Lecture 27): Case studies: Microarchitectures of existing chips.

April 30 (Lecture 28): Guest lecture from local industry (to be determined).
May 1: Discussion session, as needed.

May 2 (Lecture 29): Last class meeting. Review of the course.

Final project design reviews in 541a ENS, May 3,4, by appointment.
May 11: Final project report due in 541a, 10pm.

Note: There will be no final exam in this course.